

# Pulsar Navigation for Crewed Exploration of the Solar System

Completed Technology Project (2016 - 2019)



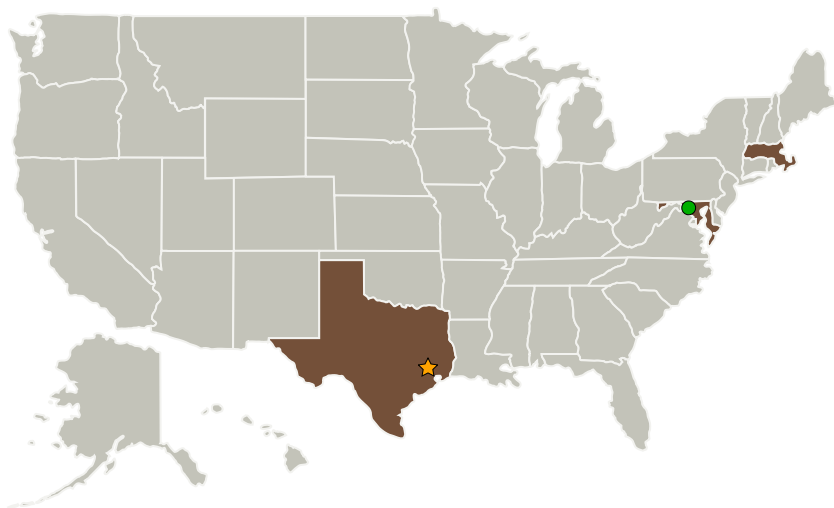
## Project Introduction

The Deep Space Gateway station will need to be able to navigate autonomously without relying on the DSN and the ground to determine its navigation state. X-ray navigation will complement optical navigation to provide a navigation capability that will be essential for Human Space Exploration missions. This technology addresses two key requirements: accurate navigation and autonomy, a key JSC Technology Focus Area.

## Anticipated Benefits

The Gateway station will need to be able to navigate autonomously without relying on the DSN and the ground to determine its navigation state. X-ray navigation, along with optical navigation will provide a navigation capability that will be essential for the Evolvable Mars Campaign. This technology addresses two key requirements: accurate navigation and autonomy.

## Primary U.S. Work Locations and Key Partners



Pulsar Navigation for Crewed  
Exploration of the Solar System

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
Texas A & M University-College Station(Texas A&M)	Supporting Organization	Academia Hispanic Serving Institutions (HSI)	College Station, Texas
The Charles Stark Draper Laboratory, Inc.	Supporting Organization	R&D Center	Cambridge, Massachusetts
The University of Texas at Austin	Supporting Organization	Academia	Austin, Texas

Primary U.S. Work Locations	
Maryland	Massachusetts
Texas	

**Project Website:**

<https://www.nasa.gov/directorates/spacetech/home/index.html>

**Organizational Responsibility****Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Center Innovation Fund: JSC CIF

**Project Management****Program Director:**

Michael R Lapointe

**Program Manager:**

Carlos H Westhelle

**Principal Investigator:**

Christopher N D'souza

**Co-Investigator:**

Ronney S Lovelace

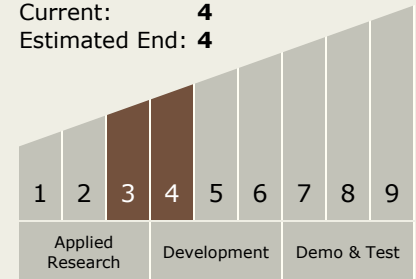
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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.4 Network Provided Position, Navigation, and Timing
    - └ TX05.4.2 Revolutionary Position, Navigation, and Timing Technologies

## Target Destinations

The Moon, Mars, Others Inside the Solar System